"Overview of Flights of the University of Washington's Convair-580 and Measurements Obtained in CLAMS"

by

Peter V. Hobbs

TABLE 1. INSTRUMENTATION ABOARD THE UNIVERSITY OF WASHINGTON'S CONVAIR-580 IN CLA MS

(a) Navigational and Flight Characteristics

Parameter	Instrument Type	Manufacturer	Range (and error)	UW Computer Code
Latitude and longitude	Global Positioning System (GPS)	Trimble TANS/Vector	Global (~2-5 m)	tans-lat (deg) tans-lon (deg)
True airspeed	Variable capacitance	Rosemount Model F2VL 781A	0 to 250 m s^{-1} (<0.2%)	tasknt (kts)
True airspeed	Air computer	Shadin	0 to 250 m s^{-1} (<0.2%)	shadin_tas
Heading	From TANS/Vector	Trimble TANS/Vector	0 to 360Þ(± 1Þ)	tans-azimth (0 deg is true north)
Altitude	Global Positioning System (GPS)	Trimble TANS/Vector	0-9 km (±15-25 ft)	tans-altft (msl, ft)
Altitude above terrain	Radar altimeter	Bendix Model ALA 51A	Up to 0.75 km	ralt (agl, ft)
Pitch	Differential GPS	Trimble TANS/Vector	0 to 360Þ(±0.15Þ)	Tans-pitch (nose up positive)
Roll	Differential GPS	Trimble TANS/Vector	0 to 360Þ(±0.15Þ)	Tans-roll (right wing down negative)
Radar reflectivity	3 cm wavelength (pilot's radar)	Bendix/King (now Allied Signal)	250 km	(Not recorded)

(Cont.)

TABLE 1 (continued)

(b) General Meteorological

Parameter	Instrument Type	Manufacturer	Range (and error)	UW Computer Code
Pressure	Variable capacitance	Rosemount Model 830 BA	1100 to 150 mb (<0.2%)	pstat
Pressure altitude	Computed from pstat assuming standard atmosphere	—	0-9 km (Error depends on atmospheric conditions.)	palt (ft)
Total air temperature	Reverse-flow	In-house	-60 to 40ÞC	ttotr (ÞC)
Static air temperature	Calculated from Rosemount total temperature	Rosemount Model 102CY2CG and 414 L Bridge	-60 to 40ÞC	tstat (ÞC)
Static air temperature	Reverse-flow thermometer	In-house	-60 to 40ÞC (<0.5ÞC)	tstatr (ÞC)
Dew point temperature	Cooled-mirror dew point	Cambridge System Model TH73-244	-40 to 40ÞC (<1ÞC)	dp (ÞC)
Absolute humidity	IR optical hygrometer	Ophir Corp. Model IR-2000	0 to 10 g m^{-3} (~5%)	rhovo = Ophir2k absolute humidity (g/m3). (Also, dp_o = Ophir dew point (degC). oairt = Ophir2k air temperature (degC). rh_o = Ophir2k relative humidity (%).)
Wind direction	Calculated from TANS/Vector and Shadin	Trimble	0-360Þ(0 deg is magnetic north).	wind_dir
Wind speed	Calculated from TANS/Vector and Shadin	Trimble	—	wind_spd (kts)
Video image	Forward-looking camera and time code	Ocean Systems Splash Cam	—	—

(Cont.)

TABLE 1 (continued)

(c) Aerosol

Parameter	Instrument Type	Manufacturer	Range	UW Computer Code
Number concentration of particles (continuous flow)	Condensation particle counter	TSI Model 3022A	0-10^7 cm^{-3} (d>0.003 µm)	cnc1 (/cc)
Number concentration of particles (continuous flow)	Condensation particle counter	TSI Model 3025A	0-10^5 cm^{-3} (d>0.003 µm)	cnc2 (/cc)
Size spectrum of particles	Differential Mobility Particle Sizing Spectrometer (DMPS)	TSI (modified in-house)	0.01 to 0.6 µm (21 channels)	dmpsdn = DMPS d(log D) spectrum (/cc).
Size spectrum of particles	35 to 120 Þlight-scattering	Particle Measuring Systems Model PCASP-100X	0.12 to 3.0 µm (15 channels)	pcasprt = PCASP 100 total concentration (/cc). pcaspdn = PCASP 100 concentration spectrum (/cc).
Total particle concentration	Forward light-scattering	Particle Measuring Systems Model FSSP-300	0.3 to 20 µm (30 channels)	fsp3rt (/cc).
Size spectrum of particles	Forward light-scattering	Particle Measuring Systems Model FSSP-300	0.3 to 20 µm (30 channels)	fsp3dn = fsp300 d(log D) spectrum (/cc).
Aerodynamic size spectrum of particles and relative light scattering intensity	"Time-of-flight"	TSI Model 3320 A PS	0.5-20 µm (52 channels)	tsirt = TSI 3320 (total concentration (/cc)).

TABLE 1 (continued)

(c) Aerosol (continued)

Parameter	Instrument Type	Manufacturer	Range	UW Computer Code
Light-scattering coefficient	Integrating 3-wavelength nephelometer with backscatter shutter	MS Electron 3W-02	1.0×10^{-7} m^{-1} to 1.0×10^{-3} m^{-1} for 550 (green) and 700 (red) nm channels. 2.0×10^{-7} m^{-1} to 1.0×10^{-3} m^{-1} for 450 nm channel (blue)	nepblu = total scatter blue (/m). nepgrn = total scatter green (/m). nepred = total scatter red (/m). bkspbl = backscatter blue (/m). bkspgr = backscatter green (/m). bksprd = backscatter red (/m).
Light-scattering coefficient (ambient and extinction cell)	Integrating nephelometer	CE	10^{-7} to 10^{-2} m^{-1} at 537 nm	cetspb (/m) cetspgr (/m) cetsprd (/m)
Light-scattering coefficient (for bag-house samples)	Integrating nephelometer	Radiance Research M903	1.0×10^{-6} to 2.0×10^{-4} m^{-1} or 1.0×10^{-6} m^{-1} to 1.0×10^{-3} m^{-1}	Neph bag (m^{-1})
Light absorption and graphitic carbon	Particle soot absorption photometer (PSAP)	Radiance Research	Absorption coefficient: 10^{-7} to 10^{-2} m^{-1}; Carbon: 0.1 µm m^{-3} to 10 mg m^{-3} (±5%)	rams (m^{-1})

TABLE 1 (continued)

(d) Cloud Physics

Parameter	Instrument Type	Manufacturer	Range	UW Computer Code
Liquid water content	Hot wire resistance	DMT	0 to 5 g m^{-3}	lwdmt = cloud liquid water content from DMT (g/m^3)
Liquid water content; effective droplet radius; particle surface area	Optical sensor	Gerber Scientific Ins. PVM-100A	LWC = 0.001-10 g m^{-3}	lwpvm = cloud liquid water from PVM (g/m^3). erpvm = PVM100A effective radius (µm). psapvm = PVM100A raw surface area (cm^2/m^3). sapvm = PVM100A surface area [corrected using fssp100 drop rate] (cm^2/m^3).
Total particle concentration	Forward light-scattering	Particle Measuring Systems Model FSSP-300	0.3 to 20 µm (30 channels)	fsp3rt (/cc). fsp3dn = fsp300 d(log D) spectrum (/cc).

TABLE 1 (continued)

(e) Chemistry

Parameter	Instrument Type	Manufacturer	Range (and error)	UW Computer Code
SO_2	Pulsed fluorescence	Teco 43S (modified in-house)	0.1 to 200 ppb	so2 (ppb) = Teco 43S
O_3	UV absorption	TEI Model 49C	1-1000 ppbv (<0.5 ppbv)	o3 = Pressure corrected TEI49C ozone concentration (ppb). (o3tei = Raw TEI49C ozone concentration (ppb).)
CO	IR correlation spectrometer	Teco Model 48	0-50 ppb (~0.1 ppmv)	co (ppb) = Teco 48 (ppb)
CO_2	Infrared correlation spectrometer	Li-Cor Li-6262	0 to 300 ppmv (0.2 ppmv at 350 ppmv)	co2 (ppm) = Licor 6262
Total particulate mass and species $SO_4^{=}$, NO_3^{-}, Cl^{-}, Na^{+}, K^{+}, NH_4^{+}, Ca^{++}, Mg^{++}	37 Teflon filters, gravimetric analysis and ion exchange chromatography	Gelman Dionix (UW)	0.1 to 50 µg m^{-3} (for 500 liter air sample)	—
Carbonaceous particles (black and organic carbon)*	Quartz filters (Thermal Evolution Techniques)	T. Novakov and T. Kirchstetter (LBNL)	4-160 µg m^{-3} (±1.6 µg m^{-3}) for 1 m^3 sample	—

(Cont.)

* Guest instrument

TABLE 1 (continued)

(f) Radiation

Parameter	Instrument Type	Manufacturer	Range (and error)	UW Computer Code
UV hemispheric radiation, one upward, one downward	Diffuser, filter photo-cell (0.295 to 0.390 µm)	Eppley Lab. Inc. Model TUVR	0 to 70 W m-2 (±3 W m-2)	uvup = uv upward looking (W m-2) uvdn = uv downward looking (W m-2)
VIS-NIR hemispheric radiation (one downward and one upward viewing)	Eppley thermopile (0.3 to 3 µm)	Eppley Lab. Inc. Model PSP	0 to 1400 W m-2 (±10 W m-2)	pyrup = vis-nir upward looking (W m-2) pyrdn = vis-nir downward looking (W m-2)
Surface radiative temperature	IR radiometer 1.5ÞFOV (8 to 14 µm)	Omega Engineering OS3701	-50Þto 1000ÞC ±0.8% or reading	irtemp (degC) = surface temp. (ÞC)
Absorption and scattering of solar radiation by clouds and aerosols; BRDF and albedo of surfaces	Fourteen wavelength all-directions scanning radiometer	NASA-Goddard/ University of Washington	14 discrete wavelengths between 340 and 2300 nm	—
Aerosol optical depth, water vapor, and ozone*	14-channel Sun-tracking photometer (AATS-14)	NASA Ames (J. Redemann)	14 discrete wavelengths, 350-1558 nm	—

* Guest instrument

TABLE 2. OVERVIEW OF UNIVERSITY OF WASHINGTON'S CONVAIR-580 RESEARCH FLIGHTS IN CLAMS

Date (2001)	University of Washington Flight Number	Period of Flight (UTC)*	Principal Locations	Main Accomplishments	Other CLAMS Aircraft Flying	Satellite Overpass	Comments (For more details see section 6)
10 July	1870	1725-2220	Near Chesapeake Bay lighthouse	1) BRDF near lighthouse. 2) Vertical profile over lighthouse. Full sets of measurements (filters, etc.) at 10,000 and 4,000 ft. 3) BRDF off southern tip of Delmarva Peninsula.	OV-10 (1815-1920 UTC) Proteus (Madison-1900 UTC?)	—	1) Generally clear, but with cirrus and altocumulus increasing toward end of flight. 2) Chang in coloration of ocean across area of second set of BRDF measurements. 3) Vertical profile could be used for "closure studies."
12 July	1871	1102-1640	Near Chesapeake Bay lighthouse	1) BRDF near lighthouse (patchy cirrus). 2) Vertical profile over lighthouse. 3) Passes at 100 ft beneath hole in cirrus near 38Þ20.71' N/ 74Þ16.25' W during Terra overpass at 1554 UTC.	ER-2 (1315-1751 UTC) OV-10 (1205-1420 UTC) Proteus (1133-1639 UTC)	Terra overpass at 1554 UTC	1) Postfrontal. 2) AOD low. 3) Cirrus and altocumulus present.

(Cont.)

* Local time = UTC – 4 hours.

TABLE 2 (continued)

Date (2001)	University of Washington Flight Number	Period of Flight (UTC)*	Principal Locations	Main Accomplishments	Other CLAMS Aircraft Flying	Satellite Overpass	Comments (For more details see section 6)
14 July	1872	1433-1749	Near Chesapeake Bay lighthouse	1) Profile to 10,000 ft on transit to lighthouse. 2) Passes at 100 ft over lighthouse during Terra overpass at 1542 UTC. 3) BRDF near lighthouse. 4) Calibration of state parameter measurements against Wallops sonde.	OV-10 (1555-1750 UTC) Proteus (1415-1850 UTC) Cessna-210 (1345-1730)	Terra overpass at 1542 UTC.	1) Increasing cumulus clouds as flight progressed. 2) Low AOD.
16 July	1873	1630-1947	Near Chesapeake Bay lighthouse and buoys 44014 and 41001.	1) Passes at 100 ft between lighthouse and buoy 44014. 2) BRDF measurements at 35Þ58.6' N/73Þ59.68' W. 3) Profile to 10,000 ft at same location as BRDF measurements.	Proteus (1620-1933 UTC) Cessna-210 (1344-1708)	AVHRR overpass at 1908 UTC.	1) Flight in support of CIRES/ AVHRR retrivals. 2) Extensive cirrus cloud present. 3) Some filters for chemistry (not height resolved).

(Cont.)

* Local time = UTC – 4 hours.

TABLE 2 (continued)

Date (2001)	University of Washington Flight Number	Period of Flight (UTC)*	Principal Locations	Main Accomplishments	Other CLAMS Aircraft Flying	Satellite Overpass	Comments (For more details see section 6)
17 July	1874	1228-1816	1) Near Chesapeake Bay lighthouse. 2) Great Dismal Swamp.	1) Profile to 11,000 ft over lighthouse. Full measurement set (filters, etc.) at 9,000 ft, 6,000 ft and 3,000 ft. 2) Passes at 100 ft over lighthouse during Terra overpass at 1614 UTC. 3) BRDF measurements near lighthouse. 4) BRDF measurements over Great Dismal Swamp.	ER-2 (1300-1701 UTC) OV-10 (1623-1812 UTC) Proteus (1431-1832 UTC) Cessna-210 (1330-1800 UTC) Lear-25C (1500-1800 UTC)	Terra overpass at 1614 UTC.	1) "Golden Day" for comparison of airborne measurements with MODIS-Air-MISR and MISR. 2) Essentially cloud-free. 3) Moderate AOD.
23 July	1875	1351-1646	About 70 miles east of Wallops Flight Center.	1) Passes at 100 ft in cloud-free region during Terra overpass at 1535 UTC. 2) BRDF measurements near same location. 3) Profile to 10,000 ft (good water vapor profile).	OV-10 (1517-1641 UTC)	Terra overpass at 1535 UTC.	Low AOD.

(Cont.)

* Local time = UTC – 4 hours.

TABLE 2 (continued)

Date (2001)	University of Washington Flight Number	Period of Flight (UTC)*	Principal Locations	Main Accomplishments	Other CLAMS Aircraft Flying	Satellite Overpass	Comments (For more details see section 6)
25 July	1876	1439-1448	—	—	None		1) CLAMS Control aborted Convair-580 flight on runway due to cancellation of ER-2 flight.
26 July	1877	1145-1243	—	—	See below.	—	1) Flight terminated before collecting any data due to failure of on-board computer.
26 July	1878	1528-1909	1) Chesapeake Bay lighthouse. 2) Buoy 44014.	1) Passes at 100 ft between lighthouse and buoy 44014 with clear sky above beneath Terra overpass at 1607 UTC. 2) Slow climb to 10,000 ft then descent over buoy 44014. 3) BRDF measurements over buoy 44014. 4) AOD from 100 ft. 5) Full aerosol characterization (with filters, etc.) at 2,200 ft.	OV-10 (1316-1504 UTC and 1622-1830 UTC) Proteus (1357-1719 UTC)	Terra satellite overpass at 1607 UTC.	1) Overcast to west, but generally clear east of lighthouse. 2) Measurements should be good for comparisons with MISR and CERES.

(Cont.)

* Local time = UTC – 4 hours.

TABLE 2 (continued)

Date (2001)	University of Washington Flight Number	Period of Flight (UTC)*	Principal Locations	Main Accomplishments	Other CLAMS Aircraft Flying	Satellite Overpass	Comments (For more details see section 6)
30 July	1879	1609-1951	1) Chesapeake lighthouse. 2) Buoy 44014	1) Pass beneath ER-2 at 100 ft in best cloud-free areas available between lighthouse and buoy 44014. 2) BRDF measurements under partly cloudy skies near lighthouse, near buoy 44014 and off southern tip of Delmarva Peninsula.	ER-2 (1628-1948) OV-10 (1420-1640 UTC) Proteus (1756-1915 UTC)		1) Cloudy. Air clean after frontal passage and heavy rain on previous day. 2) Terra overpass was prior to CV-580 flight.
31 July	1880	1424-2004	1) Buoy 44004 (dark water). 2) From buoy 44004 to Great Dismal Swamp via Chesapeake Bay lighthouse.	1) Passes at 100 ft in nearly cloudless skies at buoy 44004 during Terra and ER-2 overpasses. 2) BRDF measurements in almost cloud-free conditions near buoy 44004. 3) Profile to 10,000 ft over buoy 44004. 4) Transit from buoy 44004 to Great Dismal Swamp with sun-photometer and in situ aerosol measurements en route. 5) BRDF measurements over Great Dismal Swamp in nearly cloud-free conditions.	ER-2 (1259-1857 UTC) OV-10 (1607-1806 UTC and 1922-2039 UTC) Lear-25C (1520-1807 UTC)	Terra overpass at 1624 UTC.	1) Nearly cloudless skies. 2) Low AOD. 3) Measurements should be good for comparisons with MODIS and MISR or Terra satellite and/or ER-2, and for comparison with CERES BRDF of dark water with 10 ft waves.

* Local time = UTC – 4 hours.

(Cont.)

TABLE 2 (continued)

Date (2001)	University of Washington Flight Number	Period of Flight (UTC)*	Principal Locations†	Main Accomplishments	Other CLAMS Aircraft Flying	Satellite Overpass	Comments (For more details see section 6)
2 Aug.	1881	1521-1859 (1st flight of day)	1) Chesapeake Bay lighthouse. 2) Buoy 44014. 3) About 60 miles east of Wallops Flight Center.	1) In-flight intercomparison of measurements with OV-10 aircraft. 2) Passes at 100 ft near lighthouse under clear sky during Terra overpass at 1612 UTC. 3) Slow climb to 10,000 ft near Chesapeake Bay lighthouse, followed by fast descent. 4) Full set of measurements (filters, etc.) at 2, 900 ft and 1,400 ft.	ER-2 (1459-Dryden) OV-10 (1530-1743 UTC and 1957-2140 UTC) Lear-25C (1520-1807 UTC)	Terra satellite overpass at 1612 UTC.	Clear above lighthouse. Cirrus and altocumulus to east and cumulus forming to west.
2 Aug.	1882	1914-2042 (2nd flight of day)	Chesapeake Bay lighthouse.	1) Profile to 10,000 ft NE of lighthouse followed by rapid descent in best cloud-free area. 2) BRDF measurements at low sun angle NE of lighthouse.	None.	—	Isolated cirrus in SE quadrant. Distant cumulus overland.

* Local time = UTC – 4 hours.

EXAMPLE OF CONVAIR-580 FLIGHT TRACK

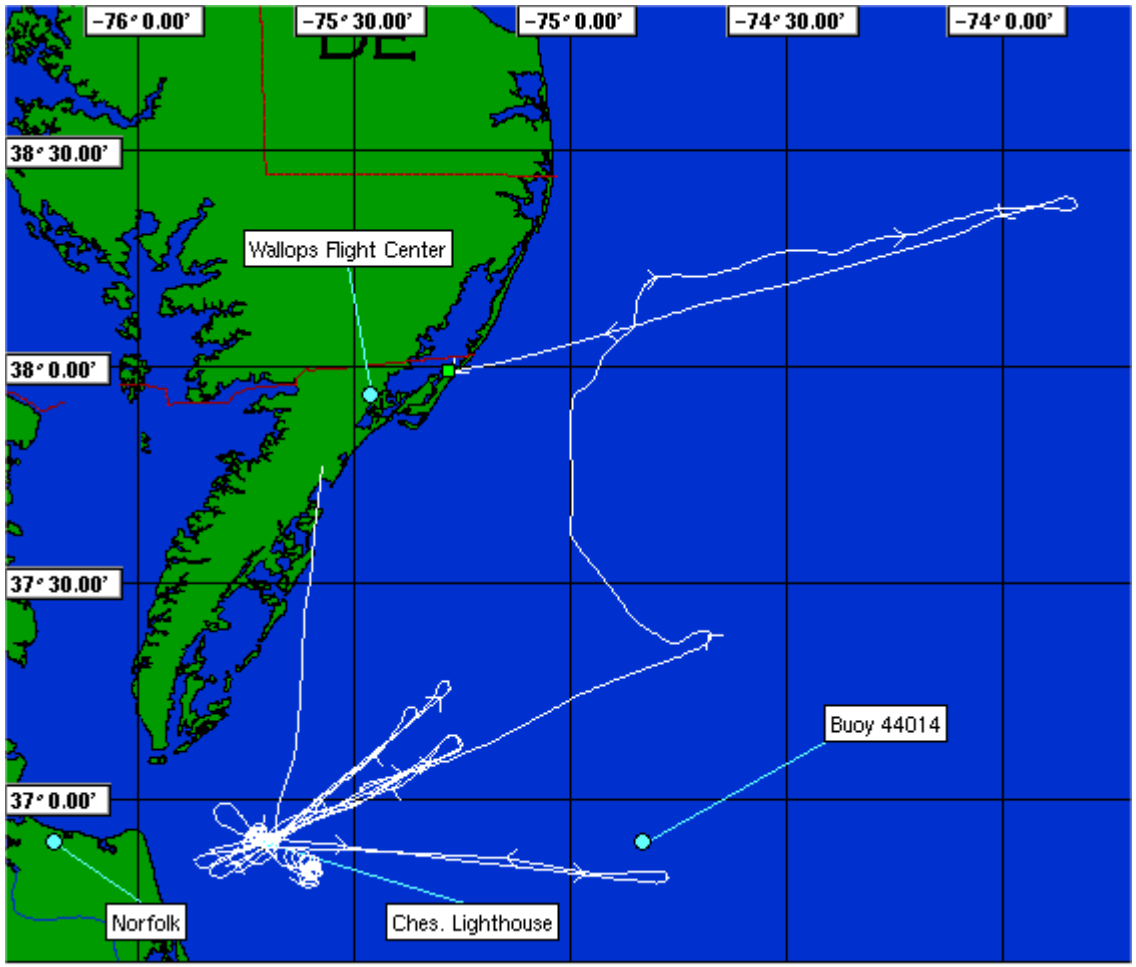

Figure 1. Flight track (white line) of the Convair-580 in CLAMS from 11:02 to 16:40 UTC on July 12, 2001 (UW flight 1871).

TABLE 3. OVERVIEW OF SOME OF THE MAIN ACCOMPLISHMENTS OF THE CONVAIR-580 FLIGHTS IN CLAMS

- Aerosol and trace gas measurements and sunphotometer measurements of aerosol optical depth and column water vapor and ozone from close to ocean surface to ~10,000 ft off Delmarva Peninsula on various occasions from July 10-August 2, 2001.
- Measurements of aerosol properties on seven occasions beneath the Terra satellite, once beneath AVHRR, and five times beneath the ER-2 aircraft.
- Measurements of aerosol properties in the vicinity of the (CERES instrumented) Chesapeake Bay lighthouse (COVE) on nine occasions.
- Measurements of BRDF of the ocean surface on fifteen occasions and over Great Dismal Swamp on two occasions.
- Measurements of aerosol properties over instrumented buoys 44014, 44004 and 41001.
- On July 17 (a CLAMS "Golden Day") six aircraft, including the Convair-580 and ER-2, were stacked above the Chesapeake Bay lighthouse under clear skies at the time of the Terra overpass.

TABLE 4. OCCASIONS ON WHICH THE UNIVERSITY OF WASHINGTON'S CONVAIR-580 AIRCRAFT FLEW BENEATH TARGETED RESEARCH SATELLITES IN CLAMS

Date (2001)	University of Washington Flight Number	Period of Flight (UTC)*	Satellite (and Time of Overpass)*	Location of Convair-580 at Time of Satellite Overpass	Notes (For more details see Sec. 6)
12 July	1871	1102-1640	Terra (1154 UTC)	Passes at 100 ft beneath cloud-free hole to north of Chesapeake Bay lighthouse.	Full vertical profile (with filters).
14 July	1872	1433-1749	Terra (1542 UTC)	Passes at 100 ft near Chesapeake Bay lighthouse.	Cloudy. Climbed to 10,000 ft during transit to lighthouse. Descended to 100 ft over lighthouse.
16 July	1873	1630-1947	AVHRR (1908 UTC)	Partial descent between Chesapeake Bay lighthouse and buoy 44014.	Extensive cirrus. Flight cut short by CLAMS Control.
17 July	1874	1228-1816	Terra (1614 UTC)	Passes at 100 ft over Chesapeake Bay lighthouse.	"Golden Day." Cloud free. Vertical profile (with filters) over lighthouse.

(Cont.)

* Local time = UTC – 4 hours

TABLE 4 (continued)

Date (2001)	University of Washington Flight Number	Period of Flight (UTC)*	Satellite (and Time of Overpass)*	Location of Convair-580 at Time of Satellite Overpass	Notes (For more details see Sec. 6)
23 July	1875	1351-1646	Terra (1535 UTC)	Passes at 100 ft in cloud-free region about 70 miles east of Wallops.	Low AOD (~ 0.05). Vertical profile to 10,000 ft in cloud-free region. Generally clear over lighthouse. Climb to 10,000 ft over buoy 44014 with cloud-free sky. Descent to 100 ft over buoy 44014 filters.
26 July	1878	1528-1909	Terra (1607 UTC)	Passes at 100 ft between Chesapeake Bay lighthouse and buoy 44014.	Flight terminated early by CLAM Control due to thunderstorm threat.
31 July	1880	1424-2004	Terra (1624 UTC)	Passes at 100 ft over buoy 44014 with nearly cloudless skies.	1707-1718 UTC: ascent to 10,000 ft over buoy 44014. Low AOD (~0.033).
2 Aug.	1881	1521-1859	Terra (1612 UTC)	Passes at 100 ft over Chesapeake Bay lighthouse.	Clear over lighthouse. Slow ascent to 10,000 ft followed by fast descent to 2900 ft.

* Local time = UTC – 4 hours

TABLE 5. MEASUREMENTS FROM THE UNIVERSITY OF WASHINGTON'S CONVAIR-580 AIRCRAFT OF THE BIDIRECTIONAL REFLECTION DISTRIBUTION FUNCTION (BRDF) WITH THE NASA GODDARD CLOUD ABSORPTION RADIOMETER (CAR) IN CLAMS.

Date (2001)	University of Washington Flight Number	Target	Latitude (deg. N)	Longitude (deg. W)	Time (UTC, hhmm)*	Satellite/ Other Airplanes	Comments
10 July	1870	Chesapeake Lighthouse Chesapeake Lighthouse	36.94 37.18	–75.70 –75.72	1804-1820 2142-2157	Terra/ OV-10	Good measurements. Some cirrus contamination.
12 July	1871	Chesapeake Lighthouse	36.95	–75.62	1218-1225	Proteus, ER-2, OV-10	Heavy cloud contamination.
14 July	1872	Chesapeake Lighthouse	36.95	–75.66	1555-1618	Proteus, Cessna-210, OV-10	Some cumulus contamination.
16 July	1873	Buoy 44001	35.98	–73.99	1756-1814	Proteus, Cessna-210	Cirrus contamination and data corruption.

(Cont.)

* Local time = UTC – 4 hours

TABLE 5 (continued)

Date (2001)	University of Washington Flight Number	Target	Latitude (deg. N)	Longitude (deg. W)	Time (UTC, hhmm)*	Satellite/ Other Airplanes	Comments
17 July	1874	Chesapeake Lighthouse	36.95	–75.68	1646-1708	Terra/ Proteus, ER-2, Cessna-210, Lear-25C	Good measurements.
		Dismal Swamp	36.54	–76.46	1727-1735		Cirro-cumulus contamination.
23 July	1875	Buoy 44009	37.83	–74.34	1500-1519		Good measurements.
26 July	1878	Buoy 44014	36.46	–74.74	1748-1804	Terra/ Proteus, OV-10	Good measurements.
30 July	1879	Chesapeake Lighthouse	36.88	–75.77	1645-1654	Terra/ Proteus, ER-2, OV-10	Heavy cloud contamination
		Buoy 44014	36.90	–74.55	1817-1827		Some cumulus contamination.
		Chesapeake Lighthouse	37.13	–75.5	1905-1920		Good measurements.
31 July	1880	Buoy 44004	38.56	–70.61	1652-1706	Terra\ ER-2, OV-10, Lear-25C	Good measurements.
		Dismal Swamp	36.55	–76.43	1855-1915		Good measurements.
2 August	1882	Chesapeake Lighthouse	37.04	–75.70	2001-2019	Terra\ ER-2, OV-10, Lear-25C	Good measurements.

* Local time = UTC – 4 hours

FOR MORE INFORMATION ON THE UNIVERSITY OF WASHINGTON'S CONVAIR-580 FLIGHTS IN CLAMS SEE

"Summary of Flights and Types of Data Collected Aboard the University of Washington's Convair-580 Research Aircraft in the Clams Field Study on the United States East Coast From 10 July Through 2 August 2001"

by

Peter V. Hobbs

November 2001

Available at the ftp address:

ftp://cargsun2.atmos.washington.edu/clams-report/CLAMS-MASTER.pdf

SOME TIDBITS OF RESULTS ON AEROSOLS FROM MEASUREMENTS ABOARD THE UNIVERSITY OF WASHINGTON'S CONVAIR-580 AIRCRAFT IN CLAMS

by

Peter V. Hobbs

University of Washington

and

Tom Kirchstetter and Tica Novakov

Lawrence Berkeley National Laboratory

Figure 2. Aerosol Mass Concentration vs. Dry Scattering Coefficient From University of Washington's Airborne Measurements in CLAMS

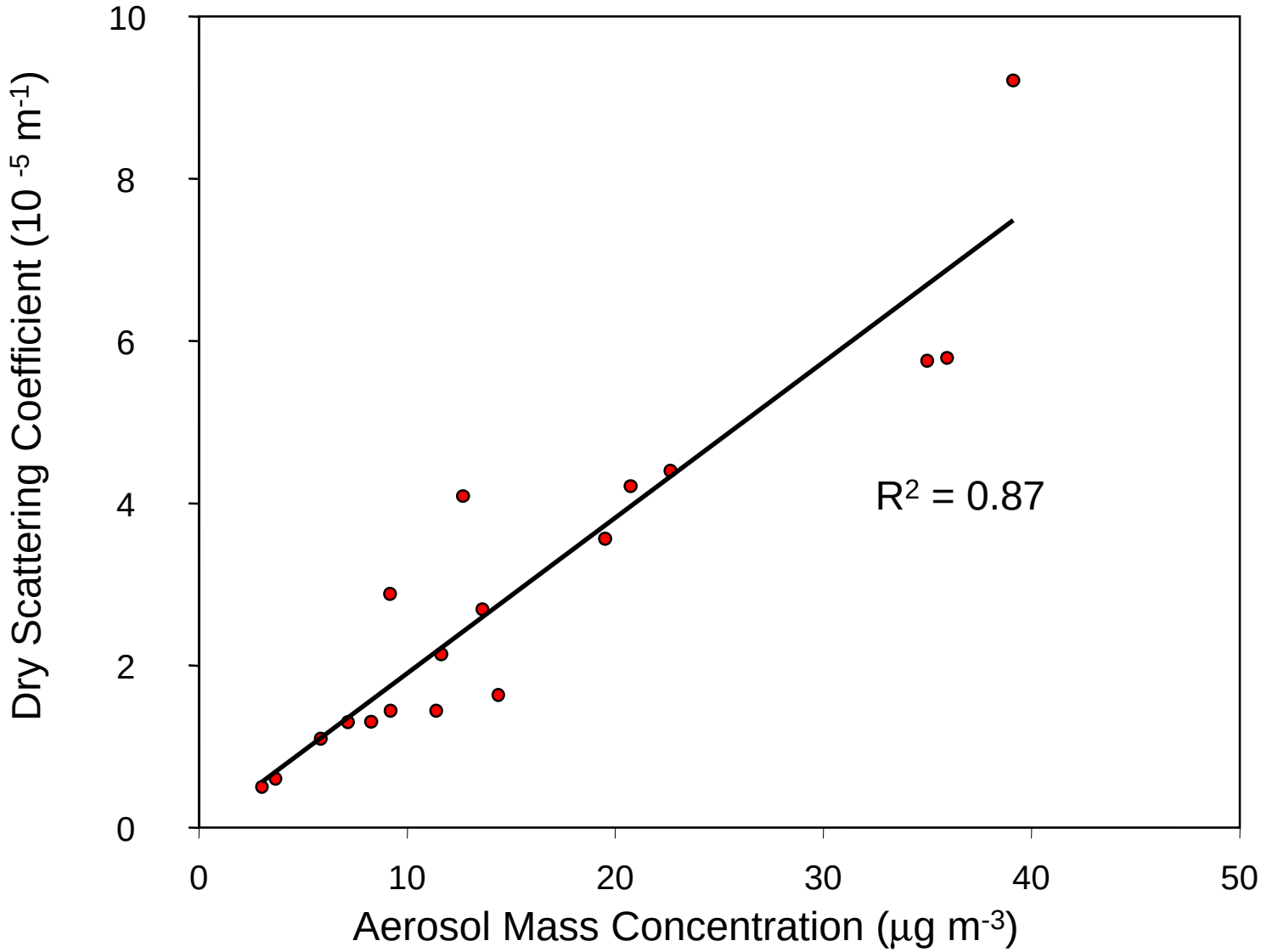

Figure 3. Carbonaceous Aerosol Mass Fractions in CLAMS From University of Washington's Airborne Measurements

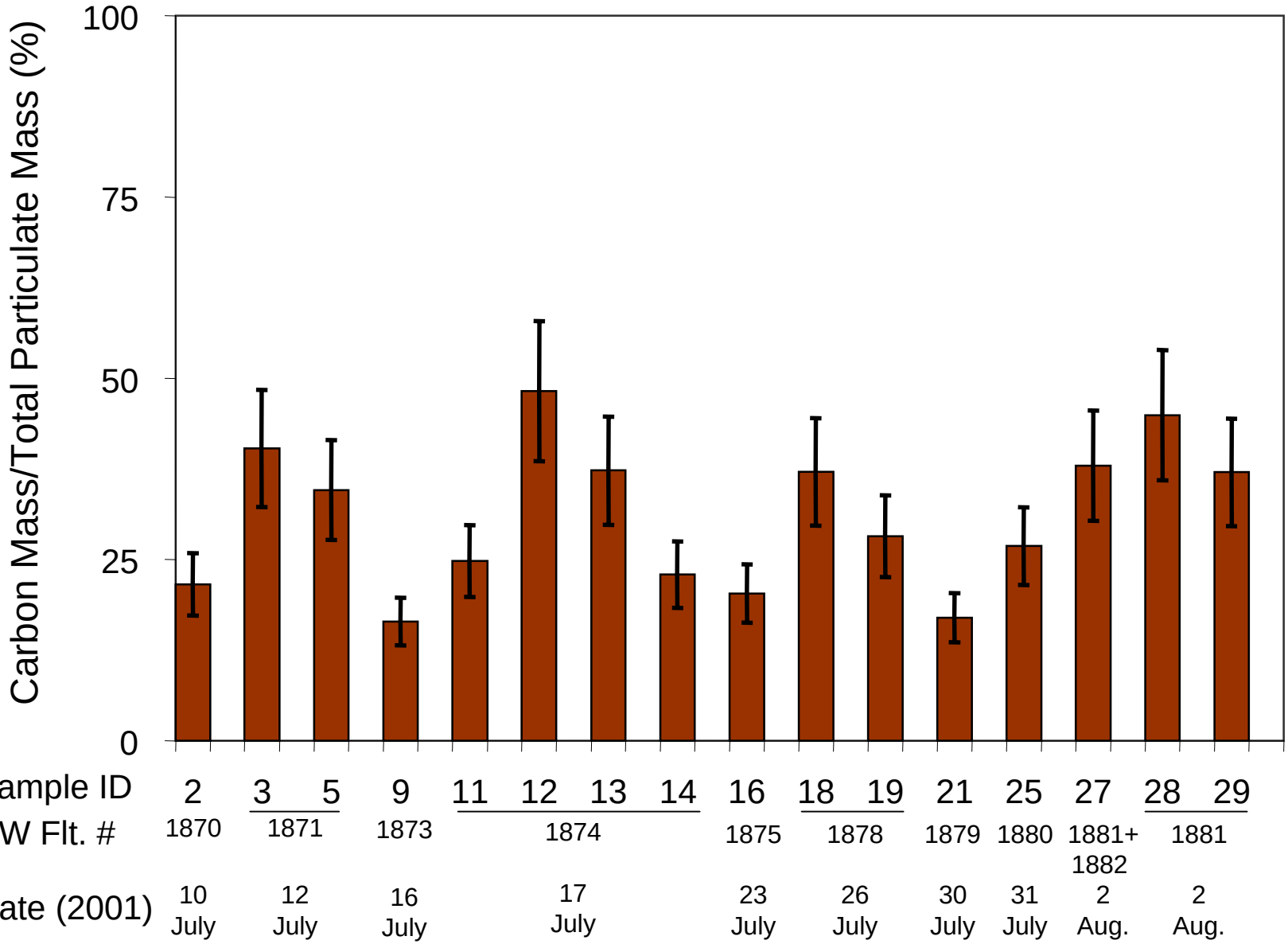

Figure 4. Total Carbon Concentration vs Dry Absorption Coefficient From University of Washington's Airborne Measurements in CLAMS